

Monitoring of Video Surveillance Robot and Sensor Network for Motion Detection, Gas Detection, Temperature Sensing using Android Smart Phone

Ajinkya Mahadik, Akshay Laddhkar, Shyam Narangwade, Vivek Kumbhar, S.M. Bhadkumbhe
P.D.E.A College of Engineering, Manjari Bk, Pune

Abstract:- Nowadays, it is quite challenging to design a better and affordable Surveillance and monitoring system. The surveillance and monitoring system should be design by considering the environmental parameters. A good surveillance system has the features like monitoring cameras that can be moved around the area which needed to be monitored .Mobile Monitoring is very useful in the surveillance of a large buildings, that requires high cost to install number of cameras. In this project we use many sensors like motion, gas, temperature, humidity etc. Surveillance and Monitoring through mobile using robotics requires less cost as there is no need to install number of cameras. Surveillance system can be useful in many areas for example: In military area, where it provides reliable real time war pictures and helps to improve troop's readiness. In civil application economic zones like in oil fields, gold mines can be protected from attackers or intruders. Mobile surveillance system is helpful in highly inflammable area or area which contains highly toxic & contaminated gases which possess direct threat to human life. One of the major advantage of Surveillance and Monitoring through mobile is that it avoids human casualties and gives access to the areas where human life is at risk. To address this problem, we propose affordable and better monitoring system based on moving camera and a WI-FI remote controlled (RC) car. The remote-controlled (RC) car is able to move in an area remote from the operator. Users can be in the next room, the next building.

Users can able to see the front view through the camera which is mounted on remote controlled (RC) car via android application in real-time. This system is using Wi-Fi as the only communication medium to connect the car to the server.

Keywords:- component (Motion sensor, Temperature sensor, Gas sensor, Camera, RC car).

I. INTRODUCTION

A monitoring and surveillance system is usually designed and built based on the characteristics of the area to be monitored. For example, areas that are too dangerous for humans to operate in require a dynamic monitoring system to act in place of a safety officer. This includes areas in which flammable liquids or gases present in excessive quantities can easily lead to an explosion or fire. In dangerous places such as these, installation of equipment and special techniques should also be designed to avoid potential explosions and fire.

Another example scenario requiring dynamic and mobile monitoring system is an area too small to be accessed

by humans. To monitor such areas, a monitoring system must be small enough to fit in the area and have the ability to move through small spaces.

Monitoring and surveillance operations in large buildings also require a dynamic control system. A large building is usually monitored by a team of security officers. There may be times in which some of the team will leave the control room to patrol from one level to another. Assuming that the time to patrol any one level is about five minutes, if the building has more than 20 levels, it would take about an hour to complete a patrol round on all levels. In addition, patrols also need to be repeated throughout the day. In this scenario, the advent of a dynamic and mobile surveillance system may lead to a more efficient process. Security officers may not need to leave the control room because they can virtually patrol on many different levels at any one time via several monitors in the control room.

Concerning the scenarios described above, in this paper we present a mobile monitoring prototype employed on a Wi-Fi remote-controlled (RC) car. The RC car is driven by a Raspberry Pi and remotely controlled by the user via the Internet. The user is provided an interface via the application to view the live video captured by the camera attached to the car.

A control panel is also provided, allowing the user to remotely control the movement of the car. The live video streaming from the camera provides a dynamic surveillance view, which can be moved around the area to get a closer look of the current suspicious event. In general, this prototype exploits the concept of Internet of Things (IoT), where the RC car will be controlled via the web by the user, while the transmission of data from the car will be sent via the wireless network to the online server.

We present a Robot car that can be controlled by an Android Application via a parallel port. The commands used to control the robot car are Simple text commands. Presents a robot car designed on Raspberry Pi and controlled by smart phone running an Android application. In this project, the robot car is meant to be used in search mission in the occurrence of natural disaster. Presents on a robotic vehicle that be controlled via Internet for surveillance purpose. The surveillance vehicle can be maneuvered via wireless commands. The vehicle is also mounted with some extra sensors like PIR Motion Detection Sensor, Gas/Smoke Detector Sensor, Temperature Sensor, which are really helpful and which can be used to measure temp humidity and detects any motion and leakage of gases.

II. LITERATURE SURVEY

A. Monitoring & Controlling of Mobile Robot via Internet through Raspberry Pi board

In today's world terrorist attacks are happening in every corner of the world. This system will help us in tackling the terrorist attacks through monitoring and controlling of mobile robot via internet with the help of raspberry pi board. Robotics movements can be monitored and controlled through wireless network by using a web browser & accessing a web page. A camera is mounted on the robot which helps us to provide a situation awareness in dangerous situation. Designing of robot is based on LINUX platform which will be interfaced with Raspberry Pi board. The PIR sensor detects a person or an object enters into a surveillance area and the smoke sensor detects the fire accidents by sensing the smoke level increase in the atmosphere. The output of the sensors can be indicated via alarm to the user. This mobile robot can be operated from everywhere in the world by using internet of things (IOT).

B. Wireless Security Control System & Sensor Network for Smoke & Fire Detection.

The project entails the design and engineering of a wireless smoke detector unit and network. The premise of the wireless network is to alert and to set off all of the smoke detectors in the network if one smoke detector is set off. The hardware modules include the PIC microcontroller, temperature sensor, smoke sensor, low battery sensor, transmitter, and receiver. The software component includes the program and code implemented via the PIC microcontroller. In its completion and entirety, the smoke detector unit properly functions and in the manner it was originally planned and designed.

C. Video Surveillance Robot Control using Smartphone and Raspberry Pi

This project provides a better & easy method for controlling a wireless robot for surveillance using an application built on Android platform. The Android application will open a web-page which has video screen for surveillance and buttons to control robot and camera. Android Smartphone and Raspberry pi board is connected to Wi-Fi. An Android Smartphone sends a wireless command which is received by Raspberry pi board and accordingly robot moves. The Video Streaming is done using MJPG streamer program that gets mjpeg data and sends it through a HTTP session. The Raspberry pi programming is done in python language. The experimental result shows that the video streamed up to 15 frames per second.

III. PROPOSED SYSTEM

A. Camera

The high definition camera module is used with Raspberry pi 3 B model for high quality video and images or photos. The Raspberry pi kit has a separate port for the camera.

B. Raspberry Pi

Raspberry Pi 3 B is one of the latest model of the raspberry pi series. It has some extra features and functions as

compared to the previous versions of the series. It has built-in WI-FI so no need of the separate WI-FI dongle.

C. Temperature Sensor

The temp sensor used in this project is DHT11 which is one of the advanced and widely used temp sensor. This sensor has also ability to sense or calculate humidity also which makes it much better as compared to others.

D. L298N Motor Driver Module

L298N Motor Driver Module is one of the most widely used module for driving high volt motors reliably. The maximum operating voltage of the L298N is 45 volts. It is capable of driving all types of motors like geared and non-geared motors.

E. Pir Motion Detection Sensor

PIR or Motion detection is used for the security purpose of any industry or personal property. This sensor has wide angle of 140 degree. Which make it more powerful and highly secure.

F. Gas/Smoke Detector

A smoke detector is a device that helps to detect a smoke and sends notification on users mobile. This help to avoid human casualties. Smoke alarms are self-contained devices that incorporate a means of detecting a fire (smoke detector) and giving a warning (alarm). They are about the size of a hand and are normally fitted to the ceiling. They can detect fires in their early stages and give you those precious minutes to enable you and your family to leave your house in safety. The term wireless is normally used to refer to any type of electrical or electronic operation which is accomplished without the use of a "hard wired" connection.

• Designs

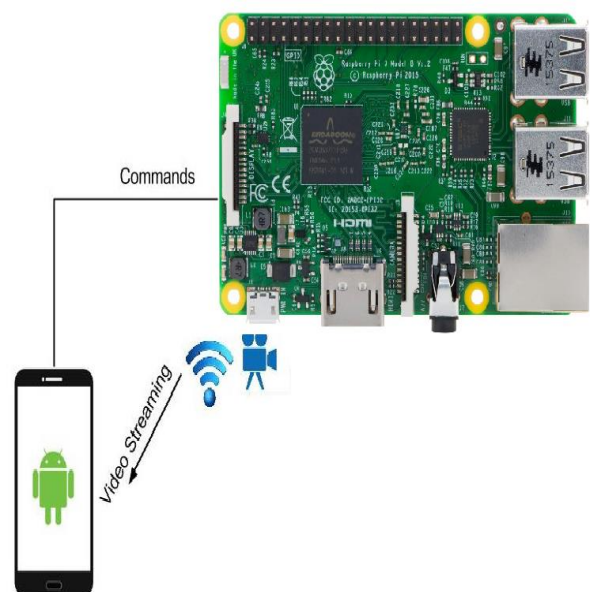


Fig 1:- Software Architectural Design

- Models

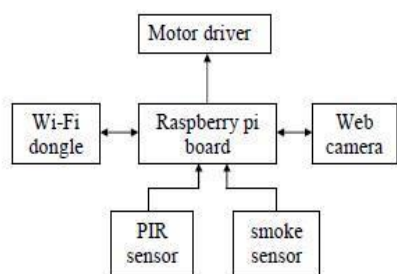


Fig.2 PC connection of Mobile Robot

Fig 2:- Raspberry pi Connection of Mobile Robot

IV. ARCHITECTURALDESIGN

A. Description of the architecture is presented.

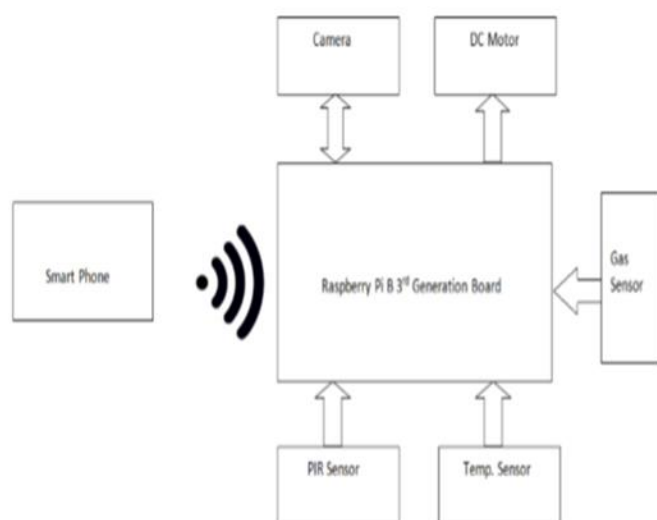


Fig 3:- Architecture diagram

B. Working Of the Raspberry Pi Robot.

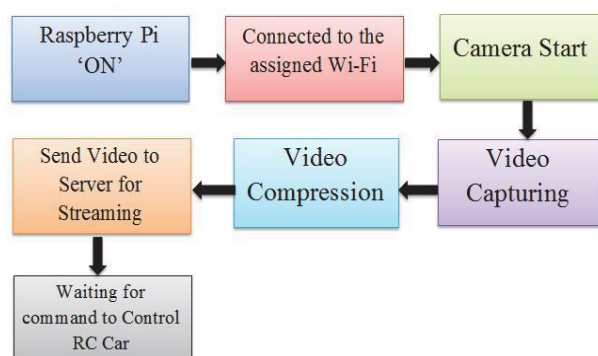


Fig 4:- Raspberry Pi Robot

C. Android Application For Controlling the Raspberry Pi Based Robot

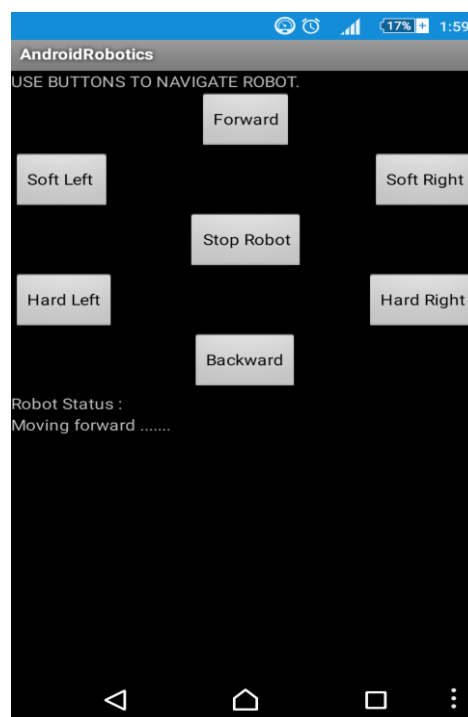
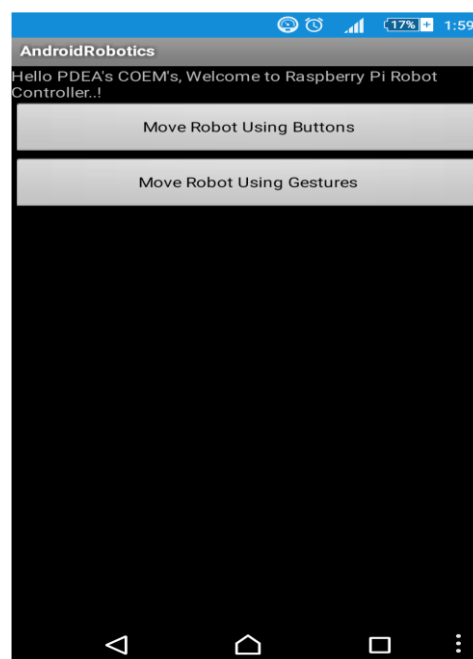


Fig 5:- Android Application For Data Display and Control

V. CONCLUSION

This paper presents the development work of remote monitoring prototype system using a Wi-Fi controlled RC car driven by a Raspberry Pi. The different hardware components and their assembly were described and a few studies were conducted to explore ways on how the components can be

integrated to communicate with a web interface. The camera acts as the viewer, either to provide surveillance view or to guide the user while remotely navigating the car. The web interface enables live streaming video, while the user is provided with the navigation controller panel to allow control of the RC car movement.

With a fully functional prototype, this project may be used for monitoring purposes in a building, in a hazardous area and other such locations. Several improvements can be made to enhance the capability of the project. For example, the camera maybe upgraded to a higher-quality camera to boost the quality of live streaming.

VI. ACKNOWLEDGMENT

It is a great pleasure for us in presenting the preliminary project report on 'MONITORING OF VIDEO SURVEILLANCE ROBOT AND SENSOR NETWORK FOR MOTION DETECTION AND SMOKE AND FIRE DETECTION USING ANDROID SMART PHONE'. We would like to express our special thanks to our internal guide Prof. S. M. Bhadkumbhe for giving us all the help and guidance we needed. We are really grateful to them for their kind support. Their valuable suggestions were very helpful. We are also grateful to Dr. R.V. Patil, Head of Computer Engineering Department, PDEA's College of Engineering Manjari BK for his indispensable support, suggestions. In the end our special thanks to Prof. Kale Sir for providing various resources such as laboratory with all needed software platforms, continuous Internet connection for Our Project

REFERENCES

- [1]. JohanPotgieter, GlenBright, OlafDiegel, SylvesterTlale, InternetControl of a Domestic Robot using a Wireless LAN Australasian Conference on Robotics and Automation, volume 3, 27-29 Nov 2002.
- [2]. Raspberry Pi - Teach, Learn, and Make with Raspberry Pi", Raspberry Pi, 2016. [Online]. Available: <http://www.raspberrypi.org>. [Accessed: 23 May- 2016].
- [3]. Raspberry Pi Org. Forum [Online]. Available: <http://www.raspberrypi.org/phpBB3>.
- [4]. Christian Hernandez, Racielpoot, Lizzie Narvaez, Erika Llanes and Victor Chi, Design and Implementation of a System for Wireless Control of a Robot, International Journal of Computer Science, 7(5), 163-169.
- [5]. Wireless Sensor Networks, pt I: Introduction, ElianaStavrou <http://webhosting.devshed.com/c/aiWeb-Hosting-Articles/WirelessSensorNetworks-ptI> Introductionl.
- [6]. J. Rahman, Md. Motion Detection for Video Surveillance.. [Online]. Available: <http://www.divaportal.org/smash/get/diva2:518464/FULLTEXT01.pdf>.
- [7]. Fahim Slauddin and Tarif Riyad Rahman . A Fuzzy based low-cost monitoring module built with raspberry pi python java architecture. International Conference on Smart Sensors and Application (ICSSA) , 2015.
- [8]. S. Amir, A.A. Siddiqui, N. Ahmed, and B.S. Chowdhury. Implementation of line tracking algorithm using raspberry pi in mari time environment. IEEE International Conference on Industrial Engineering and Engineering Management, 2014.
- [9]. Zhang, Z., The Internet Remote Robot with Skype Webcam, In System Science and Engineering (ICSSE), International Conference on (pp.117-119). IEEE, 2012.
- [10]. Christian Micheloni, An Autonomous Vehicle for Video Surveillance of Indoor Environments, IEEE Transaction on Vehicular Technology, Vol. 56, No. 2, March 2007.